(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 334 671 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
08.06.2005 Bulletin 2005/23

(21) Application number: **01981103.3**

(22) Date of filing: **13.11.2001**

(51) Int Cl.[7]: **A45D 29/02**

(86) International application number:
PCT/JP2001/009925

(87) International publication number:
WO 2002/039844 (23.05.2002 Gazette 2002/21)

(54) **NAIL CLIPPER**

NAGELSCHNEIDER

COUPE-ONGLES

(84) Designated Contracting States:
DE FR GB

(30) Priority: **16.11.2000 JP 2000349477**

(43) Date of publication of application:
13.08.2003 Bulletin 2003/33

(73) Proprietor: **Kai R & D Center Co., Ltd.**
Seki-shi, Gifu 501-3992 (JP)

(72) Inventors:
- **SHINODA, Yasuyuki,**
  c/o KAI R & D CENTER CO., LTD.
  Seki-shi, Gifu 501-3992 (JP)
- **KOIDE, Takashi,**
  c/o KAI R & D CENTER CO., LTD.
  Seki-shi, Gifu 501-3992 (JP)

(74) Representative: **Banzer, Hans-Jörg, Dipl.-Ing.**
Kraus & Weisert
Patent- und Rechtsanwälte
Thomas-Wimmer-Ring 15
80539 München (DE)

(56) References cited:
JP-B2- 2 044 204
JP-U- 3 119 307
JP-U- 4 068 706
US-A- 3 093 898
US-A- 3 986 257

- **PATENT ABSTRACTS OF JAPAN vol. 1999, no. 06, 31 March 1999 (1999-03-31) & JP 09 182613 A (SO ICHU), 15 July 1997 (1997-07-15)**

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 1 334 671 B1

Description

TECHNICAL FIELD

[0001] The present invention relates to nail clippers.

BACKGROUND ART

[0002] A conventional nail clipper, for example, as shown in Japanese Unexamined Utility Model Publication No. Sho 61-82502 has a supporting shaft which is notched to form a bearing hole, and a connecting pin attached to a lever is inserted to the bearing hole. In this nail clipper, although the lever can be incorporated into the supporting shaft easily by virtue of the bearing hole opening to the periphery of the shaft, this configuration per se involves problems that the connecting pin of the lever easily slips off the bearing hole of the supporting shaft and that the strength of the portion of the supporting shaft around the bearing hole is lowered. In addition, it is troublesome to form a supporting shaft having such a shape of bearing hole as described above.

[0003] In US 3,093,898 a nail clipper according to the preamble of claim 1 is disclosed.

[0004] It is an objective of the present invention to provide nail clippers, capable of facilitating incorporation of a lever, ensuring bearing of the lever and enhancing the strength of the supporting section. It is another objective of the present invention to provide a nail clipper whose supporting shaft can be molded easily.

DISCLOSURE OF THE INVENTION

[0005] In order to attain the objectives as described above, a nail clipper according to claim 1 is provided. The dependent claims define preferred or advantageous embodiments of the present invention.

[0006] The nail clipper according to an embodiment contains an upper blade body having an upper cutting edge; a lower blade body having a lower cutting edge opposed to the upper cutting edge; a supporting shaft inserted to the blade bodies near the cutting edges respectively, a lower end portion of the supporting shaft being engaged with the lower blade body to be locked therewith, while an upper end portion of the supporting shaft protrudes upward through the upper blade body; and a lever having a first supporting section; the first supporting section being linked on the upper blade body to a second supporting section provided at an upper end portion of the supporting shaft; wherein the cutting edges of the blade bodies are brought into press contact with each other by pressing the upper blade body with the lever against resilience of the upper and lower blade bodies. In this nail clipper, either the first supporting section of the lever or the second supporting section of the supporting shaft is a boss, while the other supporting section is a groove, with which the boss is engaged. The groove contains a mouth portion through which the boss is engaged and disengaged, a guiding portion capable of pivotally supporting the boss, and a connecting portion connecting the mouth portion and the guiding portion to each other. The groove has a pair of side wall surfaces opposing each other in the mouth portion, connecting portion and guiding portion and also a bottom surface connecting the side wall surfaces to each other.

[0007] The nail clipper according another embodiment contains an upper blade body having an upper cutting edge; a lower blade body having a lower cutting edge opposed to the upper cutting edge; a supporting shaft inserted to the blade bodies near the cutting edges respectively, a lower end portion of the supporting shaft being engaged with the lower blade body, while an upper end portion of the supporting shaft protrudes upward through the upper blade body; a lever having a pair of supporting arms; the upper end portion of the supporting shaft being inserted on the upper blade body to a bearing recess defined between the supporting arms of the lever; a first supporting section provided in the supporting arms; and a second supporting section provided at the upper end portion of the supporting shaft; the first and second supporting sections being linked to each other; wherein the upper cutting edge and the lower cutting edge are brought into press contact with each other by pressing the upper blade body with the lever against resilience of the upper and lower blade bodies. In this nail clipper, either the first supporting section of the lever or the second supporting section of the supporting shaft is a pair of bosses opposing each other, and the other supporting section is a pair of grooves, with which the bosses are engaged respectively. Each groove has a mouth portion through which the boss is engaged and disengaged, a guiding portion capable of pivotally supporting the boss, and a connecting portion connecting the mouth portion and the guiding portion to each other. Each groove has a pair of side wall surfaces opposing each other in the mouth portion, connecting portion and guiding portion and also a bottom surface connecting the side wall surfaces to each other.

[0008] The nail clipper according to another embodiment contains an upper blade body having an upper cutting edge; a lower blade body having a lower cutting edge opposed to the upper cutting edge; a supporting shaft inserted to the blade bodies near the cutting edges respectively, a lower end portion of the supporting shaft being engaged with the lower blade body to be locked therewith, while an upper end portion of the supporting shaft protrudes upward through the upper blade body; and a lever having a pair of supporting arms; the upper end portion of the supporting shaft being inserted on the upper blade body to a bearing recess defined between the supporting arms of the lever; a first supporting section provided in the supporting arms; and a second supporting section provided at the upper end portion of the supporting shaft; the first and second supporting sections being linked to each other; wherein the upper cutting edge and the lower cutting edge are brought into

press contact with each other by pressing the upper blade body with the lever against resilience of the upper and lower blade bodies. In this nail clipper, the first supporting section of the lever is a pair of bosses protruding from the supporting arms respectively to oppose each other in the bearing recess of the lever; whereas the second supporting section of the supporting shaft is a groove formed continuously fully along the circumference thereof, with which the bosses are engaged. Each groove has a mouth portion through which the bosses are engaged and disengaged and a guiding portion capable of pivotally supporting the bosses.

[0009] In the nail clipper, the supporting shaft may be molded with a synthetic resin material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. 1(a) is a front view of the nail clipper according to a first embodiment, showing a state where the nail clipper is at rest; Fig. 1(b) is a perspective view showing the supporting shaft of the nail clipper; and Fig. 1(c) is a perspective view showing the lever of the nail clipper;

Fig. 2(a) is a front view of the supporting shaft of the nail clipper; Fig. 2(b) is a left side view of the supporting shaft shown in Fig. 2(a); and Fig. 2(c) is a bottom view of the supporting shaft shown in Fig. 2 (a);

Fig. 3(a) is a cross-sectional view taken along the line 3a-3a in Fig. 2(a); Fig. 3(b) is a cross-sectional view taken along the line 3b-3b in Fig. 2(a); and Fig. 3(c) is a cross-sectional view taken along the line 3c-3c in Fig. 2(a);

Fig. 4(a) is a partial plan view of the lever of the nail clipper; and Fig. 4(b) is a left side view of the lever shown in Fig. 4(a);

Figs. 5(a), 5(b) and 5(c) are partial cross-sectional views showing process steps of engaging the pair of bosses of the lever with the grooves of the supporting shaft;

Fig. 6(a) is a cross-sectional view taken along the line 6a-6a in Fig. 5(b); and Fig. 6(b) is a cross-sectional view taken along the line 6b-6b in Fig. 5(c);

Fig. 7(a) is a front view of the nail clipper according to the first embodiment showing a state where the nail clipper is ready for use; and Fig. 7(b) is a front view thereof showing a state where the nail clipper is in action;

Fig. 8(a) is a front view showing the support shaft in the nail clipper according to another embodiment; Fig. 8(b) is a left side view of the supporting shaft shown in Fig. 8(a); Fig. 8(c) is a cross-sectional view taken along the liner 8c-8c in Fig. 8(a); and Fig. 8 (d) is a cross-sectional view taken along the line 8d-8d in Fig. 8(a);

Fig. 9(a) is a cross-sectional view showing a transient step of forming bosses in the lever of the nail clipper according to another embodiment; and Fig. 9(b) is a cross-sectional view showing the bosses; and

Fig. 10(a) is a front view showing the groove of the supporting shaft in the nail clipper according to another embodiment; and Fig. 10(b) is a cross-sectional view taken along the line 10b-10b in Fig. 10 (a).

BEST MODE FOR CARRYING OUT THE INVENTION

[0011] The nail clipper according to a first embodiment of the present invention will be described below referring to Figs. 1 to 7.

Scheme of nail clipper

[0012] As shown in Fig. 1(a), the nail clipper has an upper blade body 1 and a lower blade body 2 each having a plate form, which are fixed to each other at proximal portions 1a and 2a. The upper blade body 1 and the lower blade body 2 have resilience and can be moved closer to and away from each other. The upper blade body 1 and the lower blade body 2 have cutting edges 3 and 4 formed at the distal ends thereof respectively to oppose each other. The upper cutting edge 3 and the lower cutting edge 4 are normally spaced away from each other by the resilience of the blade bodies 1 and 2. As shown in Figs. 5(a), 5(b) and 5(c), circular bearing holes 5 and 6 are defined through the upper blade body 1 and the lower blade body 2, and they are located near the cutting edges 3 and 4, respectively.

[0013] A supporting shaft 7 shown in Fig. 1(b) penetrates the upper blade body 1 through the bearing hole 5 thereof and the lower blade body 2 through the bearing hole 6 thereof. This supporting shaft 7 contains a large-diameter head 8 formed at the lower end thereof and a small-diameter shank 10 extended from the head 8 upward through a step 9. The head 8 is locked by the rim of the bearing hole 6 on the lower side of the lower blade body 2. An upper end portion 11 of the shank 10 protrudes through the bearing hole 5 to the upper side of the upper blade body 1.

[0014] A lever 12 shown in Fig. 1(c) is placed on the upper side of the upper blade body 1. The lever 12 is forked at the distal portion to form a pair of supporting arms 13 and also a bearing recess 14 between these two supporting arms 13. The upper end portion 11 of the

supporting shaft 7 is inserted to this bearing recess 14. Each supporting arm 13 of the lever 12 and the upper end portion 11 of the supporting shaft 7 are linked to each other in a supporting section S.

Materials of supporting shaft 7 and lever 12

[0015] Both the supporting shaft 7 and the lever 12 are integrally molded respectively with a synthetic resin material. The synthetic resin material is based on polyamide, polypropylene or aromatic nylon and can contain a predetermined filler. As the filler, a glass fiber, a mineral fiber or a carbon fiber can be used singly, or a combination of at least two of the glass fiber, mineral fiber and carbon fiber may be used. Provided that the content (wt %) of such fillers is α, the value α is defined in this embodiment as $15\% \leq \alpha \leq 65\%$. However, it is preferably $40\% \leq \alpha \leq 60\%$.

[0016] The following characteristics can be obtained by utilizing such synthetic resins.

(1) Synthetic resins have high strength and high rigidity after wetting or at high temperatures, high impact strength and high elongation at break as rigid materials and excellent fatigue strength, so that the shaft 7 and the lever 12 come to have high strength and rigidity.

(2) Synthetic resins have good fluidity and provide good appearance, since they can be subjected to injection molding at a mold temperature of 80 to 110°C and since dies, screws and cylinders do not wear much; and

(3) Synthetic resins do not wear much when they are brought into contact with metallic materials to improve wear resistance of the shaft 7 and of the lever 12.

Linking structure of supporting shaft 7 and lever 12

[0017] As shown in Fig. 1(c), in the bearing recess 14 of the lever 12, a boss 15 (supporting section S) is formed on each supporting arm 13 such that the boss formed on one supporting arm 13 opposes the counterpart formed on the other supporting arm 13. Both the head 8 and the shank 10 of the supporting shaft 7 are formed to have circular cross sections respectively. The shank 10 has on each side of the circumference thereof a pair of grooves 16 (supporting section S) at 180° intervals to oppose the bosses 15 respectively, and the bosses 15 are engaged with the opposing grooves 16 respectively.

[0018] As shown in Figs. 1(b), 2(a) to 2(c) and Figs. 3(a) to 3(c), each groove 16 contains a mouth portion 17 engageable with and disengageable from the boss 15, a guiding portion 18 capable of pivotally supporting the boss 15, and a connecting portion 19 connecting the mouth portion 17 and the guiding portion 18 to each other. Each groove 16 has a pair of opposing side wall surfaces 20 in the mouth portion 17, connecting portion 19 and guiding portion 18; a bottom surface 21 connecting the pair of side wall surfaces 20 to each other in the mouth portion 17, connecting portion 19 and guiding portion 18; and an opening 22 opposing the bottom surface 21. The pair of grooves 16 are separated from each other by a common bottom plate 23 throughout the mouth portion 17, connecting portion 19 and guiding portion 18. The bottom surfaces 21 of the grooves 16 are located on each side of the bottom plate 23 in the mouth portion 17, connecting portion 19 and guiding portion 18.

[0019] The center line between the pair of side wall surfaces 20 in each groove 16 extends throughout the mouth portion 17, connecting portion 19 and guiding portion 18. The center line contains a first portion 17a running through the mouth portion 17, a second portion 19a running through the connecting portion 19 and a third portion 18a running through the guiding portion 18. The first portion 17a extends from the mouth portion 17 to the connecting portion 19 orthogonally to the axial direction 7a of the supporting shaft 7. The third portion 18a extends from the connecting portion 19 to the guiding portion 18 along the axial direction 7a of the supporting shaft 7. The second portion 19a is arcuated to connect the first portion 17a and the third portion 18a to each other.

[0020] The pair of side wall surfaces 20 in each groove 16 are inclined to be away from each other toward the opening 22. Thus, the distance W between the side wall surfaces 20 in each groove 16 is designed to be greater on the opening (22) side than on the bottom surface (21) side.

[0021] Provided that the thickness of the bottom plate 23 or the distance between the bottom surfaces 21 of the grooves 16 is T; the distance between the opening 22 of the grooves 16 or the outside diameter of the shank 10 of the supporting shaft 7 is D_{10}; and that the value T (thickness)/D_{10} (outside diameter) is A, the value A is set within the range of $0 \leq A \leq 0.5$. More preferably, the value A is set within the range of $0.2 \leq A \leq 0.4$. In each groove 16 of this embodiment, the bottom plate 23 is formed throughout the mouth portion 17, connecting portion 19 and guiding portion 18. However, for example, the bottom plate 23 may be formed in the mouth portion 17 and a part of the connecting portion 19, and the bottom plate 23 may be omitted in the rest of the connecting portion 19 and in the guiding portion 18 to allow the grooves 16 to communicate with each other. In the case where the bottom plate 23 is omitted, T = 0, and hence A = 0.

[0022] Provided that the distance between the side wall surfaces 20 in the guiding portion 18 of each groove 16 and the outside diameter of the shank 10 of the supporting shaft 7 are W and D_{10} respectively and that the value W (distance)/D_{10} (outside diameter) is B, the val-

ue B is set within the range of $0.15 \leq B \leq 0.8$ in this embodiment. The value B is more preferably set within the range of $0.4 \leq B \leq 0.7$.

[0023] In the supporting shaft 7, the outside diameter D_8 of the head 8 is designed to be greater than the outside diameter D_{10} of the shank 10. Provided that the length of the head 8 along the axial direction 7a and the length of the shank 10 along the axial direction 7a are H and L respectively and that the value H (width)/L (length) is C, the value C is set within the range of $0.05 \leq C \leq 0.3$ in this embodiment. The value C is more preferably set within the range of $0.1 \leq C \leq 0.2$.

[0024] Further, in the supporting shaft 7, the step 9 present between the head 8 and the shank 10 has a reinforcing portion 24 having an arcuate cross section formed fully along the outer circumference. Provided that the radius of the reinforcing portion 24 is r, the value r is set within the range of $0.1 \text{ mm} \leq r \leq 3 \text{ mm}$. The value r is more preferably set within the range of $0.2 \text{ mm} \leq r \leq 1.5 \text{ mm}$.

[0025] Referring to the thickness T of the bottom plate 23 present between the grooves 16, each bottom surface 21 is sloped or stepped from the mouth portion 17 toward the guiding portion 18 so that the thickness T is greater on the mouth portion (17) side than on the guiding portion (18) side. In other words, each groove 16 is designed to have such a depth as is slightly shallower on the mouth portion (17) side than on the guiding portion (18) side. Meanwhile, the distance W between the side wall surfaces 20 in each groove 16 is designed to be greater on the mouth portion (17) side than on the connecting portion (19) side or the pivotal guiding portion (18) side. Further, the supporting shaft 7 has a locking pin hole 25 formed in the head 8 thereof.

[0026] Next, the bosses 15 shown in Fig. 1(c) and Figs. 4(a) and 4(b) will be described. Each boss 15 has a peripheral surface 28 formed to extend from a proximal portion 26 to a distal portion 27 thereof, and an end face 29 provided at the distal portion 27. In each boss 15, the cross section taken orthogonal to the axial direction 15a has a circular shape. The peripheral surface 28 is tilted with respect to the axial direction 15a. The peripheral surface 28 of each boss 15 is designed to have an outside diameter D_{26} at the proximal portion 26, which is greater than the outside diameter D_{27} of the same at the distal portion 27. Thus, a cross-sectional area of each boss 15 taken orthogonal to the axial direction 15a reduces gradually from the proximal portion (26) side toward the distal portion (27) side.

[0027] In each boss 15, provided that the outside diameter of the peripheral surface 28 at the proximal portion 26 and the length from the proximal portion 26 to the distal portion 27 in the axial direction 15a are D_{26} and M respectively, and that the value D_{26} (outside diameter)/M (length) is E, the value E is set within the range of $1 \leq E \leq 3$ in this embodiment. The value E is more preferably set within the range of $1.5 \leq E \leq 2.5$.

[0028] In the bosses 15, provided that the sum of the length M in the axial direction 15a from the proximal portion 26 to the distal portion 27 in one boss 15 and the length M in the axial direction 15a from the proximal portion 26 to the distal portion 27 in the other boss 15 is N (M + M), and the dimension of a clearance 30 secured between the distal portions 27 of the bosses 15 (i.e., the clearance between the end faces 29) is P, and that the value N (sum of lengths)/P (clearance) is F, the value F is set within the range of $1 \leq F \leq 3$ in this embodiment. The value F is more preferably set within the range of $1.3 \leq F \leq 2.3$.

[0029] Next, the procedures of coupling the bosses 15 with the grooves 16 respectively and supporting state between them will be described.

[0030] As shown in Fig. 5(a), in the state where the supporting shaft 7 penetrates through the upper and lower blade bodies 1 and 2, a locking pin (not shown) is inserted to the locking pin hole 25 formed at the head 8 of the supporting shaft 7 to achieve positioning of the supporting shaft 7, and also the upper blade body 1 is pushed down so that the cutting edges 3 and 4 of the blade bodies 1 and 2 approach each other. In this state, the supporting arms 13 of the lever 12 are applied onto the upper side of the upper blade body 1, and the bosses 15 of the supporting arms 13 are moved, on the upper side of the upper blade body 1, toward the grooves 16 formed at the upper end portion 11 of the shank 10 in the supporting shaft 7.

[0031] Next, as shown in Figs. 5(b) and 6(a), each boss 15 is engaged with the mouth portion 17 of the opposed groove 16 while the upper end portion 11 of the shank 10 is inserted to the bearing recess 14 defined between the supporting arms 13. At the initial stage of engagement, each boss 15 approaches the side wall surfaces 20 of the groove 16 such that the peripheral surface 28 of the boss 15 slides along the side wall surfaces 20 of the groove 16 and that the end face 29 of the boss 15 slides along the bottom surface 21 of the groove 16.

[0032] Further, as shown in Figs. 5(c) and 6(b), each boss 15 is slipped from the mouth portion 17 of the groove 16 into the guiding portion 18 through the connecting portion 19 in each groove. In the state where the boss 15 is fully engaged with the groove 16, the boss 15 is brought into pressure contact with the side wall surfaces 20 of the guiding portion 18 under the resilience of the upper and lower blade bodies 1 and 2 so as to regulate the boss 15 not to shift toward the connecting portion 19 of the groove 16.

Example of how the nail clipper is used

[0033] In the state where the nail clipper is at rest as shown in Fig. 1(a), the lever 12 is turned over to rest on the upper side of the upper blade body 1, and the upper and lower blade bodies 1 and 2 are spaced vertically from each other under the resilience thereof. In this state, the resilience of the upper blade body 1 is borne

by the bosses 15 and the grooves 16 formed in the shank 10 of the supporting shaft 7 through the supporting arms 13 of the lever 12; whereas the resilience of the lower blade body 2 is borne by the head 8 of the supporting shaft 7, maintaining the upper cutting edge 3 and the lower cutting edge 4 to be spaced away from each other.

[0034] Next, the lever 12 is pivoted on the upper side of the upper blade body 1 by 180° together with the supporting shaft 7 and then inverted to be positioned over the upper blade body 1 so as to form an upward slope with respect to the blade body 1, as shown in Fig. 7(a) illustrating the state where the nail clipper is ready for use. Then, the upper blade body 1 is pressed with the lever 12 against the resilience of the upper and lower blade bodies 1 and 2, and the upper cutting edge 3 and the lower cutting edge 4 are brought closer and abutted against each other, as shown in Fig. 7(b) illustrating the state where the nail clipper is in action.

[0035] In any of the states described above, the bosses 15 of the lever 12 move within the guiding portions 18 of the respective grooves 16 defined in the supporting shaft 7 following the movement of the lever 12.

Other embodiments

Another embodiment shown in Fig. 8

[0036] In the first embodiment shown in Figs. 2(a) and 2(b), each groove 16 has the mouth portion 17 only on one side of the axial line 7a of the supporting shaft 7. However, in the embodiment shown in Figs. 8(a) and 8 (b), each groove 16 has a pair of mouth portions 17 on each side of the axial line 7a of the supporting shaft 7.

Another embodiment shown in Fig. 9

[0037] In the first embodiment shown in Fig. 1(c), the entire lever 12 including the bosses 15 is molded with a synthetic resin material. However, in the embodiment shown in Fig. 9(a), the main body of the lever 12 is molded with a synthetic resin material, and a metallic boss-forming material 31 is inserted to the supporting arms 13 to be integrated with the lever 12, and then the boss-forming material 31 is cut to form a pair of bosses 15.

Another embodiment shown in Fig. 10

[0038] In the first embodiment, the grooves 16 are defined on the periphery of the shank 10 of the supporting shaft 7 to oppose diametrically each other. In place of this constitution, a groove 16 is formed fully along the circumference of the shank 10 of the supporting shaft 7. This groove 16 has an upper edge and a lower edge, and the upper edge has a wavy convexoconcavity 32. Further, a guiding portion 18 also serving as a mouth portion 17 is provided between each concavity 32a of the upper edge and the lower edge. The boss 15 in each supporting arm 13 of the lever 12 is introduced through this mouth portion 17 into the guiding portion 18.

[0039] Although not illustrated, the groove formed fully along the circumference of the shank 10 of the supporting shaft 7 may have the following constitution. A crosswise groove is formed on the shank 10 of the supporting shaft 7 in the circumferential direction. While the crosswise groove has an upper edge and a lower edge intersecting with the axial direction 7a, a plurality of vertical grooves are formed to extend parallelwise from the upper edge in the axial direction. The crosswise groove serves both as a mouth portion and as a connecting portion. Each vertical groove serves both as a connecting portion and as a guiding portion. The bosses 15 in the supporting arms 13 of the lever 12 are introduced from the mouth portion into the guiding portions through the connecting portions, respectively.

[0040] In any of the above embodiments, the supporting shaft 7 is provided with a groove or grooves 16, whereas each supporting arm 13 of the lever 12 is provided with a boss 15. Although not illustrated, in place of this configuration, a boss may be formed on the supporting shaft 7, and a groove may be formed on each supporting arm 13 of the lever 12.

[0041] Although not shown, the configuration of the boss 15 in each supporting arm 13 of the lever 12 may be modified. While the bosses 15 in the foregoing embodiments have a truncated cone shape, they may have, for example, a columnar or semispherical shape. Further, each boss 15 may have an elliptical cross section in place of the circular cross section.

Claims

1. A nail clipper containing an upper blade body (1) having an upper cutting edge (3); a lower blade body (2) having a lower cutting edge (4) opposed to the upper cutting edge (3); a supporting shaft (7) inserted to the blade bodies (1, 2) near the cutting edges (3, 4) respectively, a lower end portion of the supporting shaft (7) being engaged with the lower blade body (2) to be locked therewith, while an upper end portion of the supporting shaft (7) protrudes upward through the upper blade body (1); and a lever (12) having a first supporting section (13) being linked on the upper blade body (1) to a second supporting section provided at an upper end portion (11) of the supporting shaft (7); the cutting edges (3, 4) of the blade bodies (1, 2) being brought into press contact with each other by pressing the upper blade body (1) with the lever (12) against resilience of the upper (1) and lower (2) blade bodies,
characterized by
a boss (15) formed as the first supporting section (13) of the lever (12) or as the second supporting section of the supporting shaft (7), and
a groove (16) formed as the other supporting sec-

tion, with which the boss (15) is engaged;
the groove (16) having a mouth portion (17) through which the boss (15) is engaged and disengaged, a guiding portion (18) capable of pivotally supporting the boss (15), and a connecting portion (19) connecting the mouth portion (17) and the guiding portion (18) to each other; the groove (16) having a pair of side wall surfaces (20) opposing each other in the mouth portion (17), connecting portion (19) and guiding (18) and also a bottom surface (21) connecting the side wall surfaces (20) to each other.

2. The nail clipper according to Claim 1, wherein the nail clipper comprises
a pair of bosses (15) comprising said boss formed as the first supporting section (13) of the lever (12) or as the second supporting section of the supporting shaft (7), and
a pair of grooves (16) comprising said groove (16) formed as the other supporting section, with which the bosses (15) are engaged respectively;
the grooves (16) each having a mouth portion (17) through which the respective boss (15) is engaged and disengaged, a guiding portion (18) capable of pivotally supporting the boss (15), and a connecting portion (19) connecting the mouth portion (17) and the guiding portion (18) to each other; the grooves (16) each having a pair of side wall surfaces (20) opposing each other in the mouth portion (17), connecting portion (19) and guiding portion (18) and also a bottom surface (21) connecting the side wall surface (20) to each other.

3. The nail clipper according to Claim 2, wherein the bosses (15) formed as one supporting section are provided in supporting arms (13) of said lever (12) respectively to oppose each other in a bearing recess (14) of the lever (12), whereas the grooves (16) formed as the other supporting section are defined on the circumference of the supporting shaft (7) to oppose the bosses (15) respectively.

4. The nail clipper according to Claim 3, wherein the grooves (16) defined in the supporting shaft (7) are separated from each other by a bottom plate (23) throughout the mouth portion (17), connecting portion (19) and guiding portion (18), and each groove has a bottom surface (21) formed on the bottom plate (23) throughout the mouth portion (17), connecting portion (19) and guiding portion (18).

5. The nail clipper according to Claim 4, wherein the distance between the bottom surfaces (21) of the grooves (16) or the thickness of the bottom plate (23) is designed to be greater on the mouth portion (17) side than on the guiding portion (18) side.

6. The nail clipper according to Claim 4 or 5, wherein provided that T represents the distance between the bottom surfaces (21) of the grooves (16) or the thickness of the bottom plate (23); D_{10} represents an outside diameter of the supporting shaft (7); and A represents a value T (thickness)/D_{10} (outside diameter), the value A is set within the range of $0 \leq A \leq 0.5$.

7. The nail clipper according to any of Claims 3 to 6, wherein a central line between the side wall surfaces (2) in each groove (16) of the supporting shaft (7) extends through the mouth portion (17), connecting portion (19) and guiding portion (18) and contains a first portion (17a) passing through the mouth portion (17), a second portion (19a) passing through the connecting portion (19) and a third portion (18a) passing through the guiding portion (18).

8. The nail clipper according to Claim 7, wherein the second portion (19a) of the central line contains a portion extending form the mouth portion (17) to the connecting portion (19) orthogonal to the axial direction of the supporting shaft (7), and a portion extending from the connecting portion (19) to the guiding portion (18) in the axial direction of the supporting shaft (7).

9. The nail clipper according to Claim 8, wherein provided that W represents the distance between the side wall surfaces (2) in the guiding portion (18) of each groove (16); D_{10} represents an outside diameter of the supporting shaft (7); and B represents a value W (distance)/D_{10} (outside diameter), the value B is set within the range of $0{,}15 \leq B \leq 0.8$.

10. The nail clipper according to any of Claims 3 to 9, wherein a distance W between the side wall surfaces (20) of each groove (16) is designed to be greater on the mouth portion (17) side then on the connecting portion (19) side or on the guiding portion (18) side.

11. The nail clipper according to Claim 3, wherein each boss (15) has a proximal portion (26), a distal portion (27), a peripheral surface (28) and an end face (29) at the distal portion (27); the boss (15) has a cross-sectional area orthogonal to the axial direction (15a) thereof, which is designed to be greater on the proximal side than on the distal side.

12. The nail clipper according to Claim 11, wherein the cross section of each boss (15) orthogonal to the axial direction thereof has a circular shape, and an outside diameter of the boss reduces gradually from the proximal portion (26) toward the distal portion (27).

13. The nail clipper according to Claim 12, wherein pro-

vided that D_{26} represents the outside diameter of the proximal portion (26) of each boss (15); M represents an axial length of the boss (15) from the proximal portion (26) to the distal portion (27); and E represents a value D_{26} (outside diameter)/M (length), the value of E is set within the range of $1 \leq E \leq 3$.

14. The nail clipper according to Claim 12 or 13, wherein provided that N represents the sum of axial lengths M in the pair of bosses (15); P represents a distance between the end faces (29) of the bosses (15); and F represents a value N (sum of lengths)/P (distance), the value F is set within the range of $1 \leq F \leq 3$.

15. The nail clipper according to Claim 3, wherein the both side wall surfaces (20) in each groove (16) of the supporting shaft (7) are provided adjacent to each other so that they are substantially in contact with the peripheral surface of the boss (15) of the lever (12).

16. The nail clipper according to Claim 15, wherein the distance W between the side wall surfaces (20) in each groove (16) of the supporting shaft (7) is designed to be greater on an opening side than on the bottom surface (21) side such that it becomes smaller toward the deeper side of the groove (16).

17. The nail clipper according to any of Claims 3 to 16, wherein the supporting shaft (7) has a head (8) located at the lower end thereof and a shank (10) formed contiguous to the head through a step (9); the head (8) has an outside diameter D_8 which is greater than an outside diameter D_{10} of the shank (10); and provided that H represents the axial length of the head (8), L represents the axial length of the shank (10) and C represents a value H (width)/L (length), the value C is set within the range of $0.05 \leq C \leq 0.3$.

18. The nail clipper according to Claim 17, wherein the step (9) formed between the head (8) and the shank (10) in the supporting shaft (7) is provided with a reinforcing portion (24) having an arcuate cross section formed fully along the periphery thereof, and provided that r represents the radius in a cross sectional profile of the reinforcing portion (24), the value r is set within the range of $0.1 \text{ mm} \leq r \leq 3 \text{ mm}$.

19. The nail clipper according to any of Claims 3 to 18, wherein, when the boss (15) is supported in the guiding portion (18) of the groove (16), the boss (15) is brought into press contact with the side wall surfaces (20) of the guiding portion (18) under resilience of the upper (1) and lower (2) blade bodies so that it does not shift toward the connecting portion (19) of the groove (16).

20. The nail clipper according to Claim 3, wherein each groove (16) has a pair of mouth portions (17) defined on each side of the axial line of the supporting shaft (7).

21. The nail clipper according to any of Claims 3 to 20, wherein the bosses (15) on the supporting arms (13) of the lever (12) are made of a metal, and in the case where the lever is molded with a synthetic resin material, the bosses (15) are formed integrally with the lever (12) using an insert.

22. The nail clipper according to any of Claims 3 to 21, wherein the supporting shaft (7) has at the lower end a locking pin hole (25).

Patentansprüche

1. Nagelschneider, aufweisend einen oberen Klingenkörper (1) mit einer oberen Schnittkante (3); einen unteren Klingenkörper (2) mit einer der oberen Schnittkante (3) gegenüberliegenden unteren Schnittkante (4); eine Haltewelle (7), welche in die Klingenkörper (1, 2) in der Nähe der jeweiligen Schnittkante (3, 4) eingeführt ist, wobei sich ein unterer Endabschnitt der Haltewelle (7) mit dem unteren Klingenkörper (2) derart in Eingriff befindet, dass er damit verriegelt ist, während ein oberer Endabschnitt der Haltewelle (7) nach oben durch den oberen Klingenkörper (1) hervorragt; und einen Hebel (12), welcher einen ersten Halteabschnitt (13) aufweist, der auf dem oberen Klingenkörper (1) mit einem zweiten Halteabschnitt verbunden ist, welcher an einem oberen Endabschnitt (11) der Haltewelle (7) vorhanden ist; wobei die Schnittkanten (3, 4) der Klingenkörper (1, 2) in einen Presskontakt miteinander gebracht werden, indem der obere Klingenkörper (1) mit dem Hebel (12) gegen eine Federwirkung des oberen (1) und des unteren (2) Klingenkörpers gedrückt wird,
gekennzeichnet durch
einen Vorsprung (15), welcher als der erste Halteabschnitt (13) des Hebels (12) oder als der zweite Halteabschnitt der Haltewelle (7) ausgebildet ist, und
eine Vertiefung (16), welche als der andere Halteabschnitt ausgebildet ist und sich mit dem Vorsprung (15) in Eingriff befindet;
wobei die Vertiefung (16) einen Öffnungsabschnitt (17), **durch** welchen der Vorsprung (15) in Eingriff gebracht und aus dem Eingriff gelöst wird, einen Führungsabschnitt (18), welcher geeignet ist, den Vorsprung (15) schwenkend zu halten, und einen Verbindungsabschnitt (19), welcher den Öffnungsabschnitt (17) und den Führungsabschnitt (18) mit-

einander verbindet, aufweist; wobei die Vertiefung (16) ein Paar Seitenwandoberflächen (20), welche einander in dem Öffnungsabschnitt (17), dem Verbindungsabschnitt (19) und dem Führungsabschnitt (18) gegenüberliegen, und auch eine Bodenoberfläche (21), welche die Seitenwandoberflächen (20) miteinander verbindet, aufweist.

2. Nagelschneider nach Anspruch 1,
wobei der Nagelschneider umfasst
ein Paar Vorsprünge (15), welche den Vorsprung, welcher als der erste Halteabschnitt (13) des Hebels (12) oder als der zweite Halteabschnitt der Haltewelle (7) ausgebildet ist, umfassen, und ein Paar Vertiefungen (16), welche die Vertiefung (16), die als der andere Halteabschnitt ausgebildet ist, umfassen und mit welchen sich die Vorsprünge (15) jeweils in Eingriff befinden;
wobei die Vertiefungen (16) jeweils einen Öffnungsabschnitt (17), durch welchen der entsprechende Vorsprung (15) in Eingriff gebracht oder aus dem Eingriff gelöst wird, einen Führungsabschnitt (18), welcher geeignet ist, den Vorsprung (15) schwenkend zu halten, und einen Verbindungsabschnitt (19), welcher den Öffnungsabschnitt (17) und den Führungsabschnitt (18) miteinander verbindet, aufweisen; wobei die Vertiefungen (16) jeweils ein Paar Seitenwandoberflächen (20), die sich in dem Öffnungsabschnitt (17), dem Verbindungsabschnitt (19) und dem Führungsabschnitt (18) einander gegenüberliegen, und auch eine Bodenoberfläche (21), welche die Seitenwandoberflächen (20) miteinander verbindet, aufweisen.

3. Nagelschneider nach Anspruch 2, wobei die Vorsprünge, welche als ein Halteabschnitt ausgebildet sind, derart in Haltearmen (13) des Hebels (12) vorhanden sind, dass sie sich jeweils einander in einer Lagervertiefung (14) des Hebels (12) gegenüberliegen, wobei die Vertiefungen (16), welche als der andere Halteabschnitt ausgebildet sind, derart auf dem Umfang der Haltewelle (7) definiert sind, dass sie jeweils den Vorsprüngen (15) gegenüberliegen.

4. Nagelschneider nach Anspruch 3, wobei die Vertiefungen (16), welche in der Haltewelle (7) definiert sind, voneinander durch eine Bodenplatte (23) über dem ganzen Öffnungsabschnitt (17), Verbindungsabschnitt (19) und Führungsabschnitt (18) getrennt sind, und wobei jede Vertiefung eine Bodenoberfläche (21) aufweist, welche auf der Bodenplatte (23) über dem ganzen Öffnungsabschnitt (17), Verbindungsabschnitt (19) und Führungsabschnitt (18) ausgebildet ist.

5. Nagelschneider nach Anspruch 4, wobei der Abstand zwischen den Bodenoberflächen (21) der Vertiefungen (16) oder die Dicke der Bodenplatte (23) derart ausgestaltet ist, dass er/sie auf der Seite des Öffnungsabschnitts (17) größer als auf der Seite des Führungsabschnitts (18) ist.

6. Nagelschneider nach Anspruch 4 oder 5, wobei, vorausgesetzt, dass T den Abstand zwischen den Bodenoberflächen (21) der Vertiefungen (16) oder die Dicke der Bodenplatte (23) repräsentiert; D_{10} einen Außendurchmesser der Haltewelle (7) repräsentiert; und A einen Wert T (Dicke) / D_{10} (Außendurchmesser) repräsentiert, der Wert A in dem Bereich $0 \leq A \leq 0{,}5$ liegt.

7. Nagelschneider nach einem der Ansprüche 3 bis 6, wobei sich eine Mittellinie zwischen den Seitenwandoberflächen (2) in jeder Vertiefung (16) der Haltewelle (7) durch den Öffnungsabschnitt (17), den Verbindungsabschnitt (19) und den Führungsabschnitt (18) erstreckt und einen ersten Abschnitt (17a), welcher durch den Öffnungsabschnitt (17) verläuft, einen zweiten Abschnitt (19a), welcher durch den Verbindungsabschnitt (19) verläuft, und einen dritten Abschnitt (18a), welcher durch den Führungsabschnitt (18) verläuft, aufweist.

8. Nagelschneider nach Anspruch 7, wobei der zweite Abschnitt (19a) der Mittellinie einen Abschnitt, welcher sich von dem Öffnungsabschnitt (17) orthogonal zu der axialen Richtung der Haltewelle (7) zu dem Verbindungsabschnitt (19) erstreckt, und einen Abschnitt, welcher sich von dem Verbindungsabschnitt (19) in der axialer Richtung der Haltewelle (7) zu dem Führungsabschnitt (18) erstreckt, aufweist.

9. Nagelschneider nach Anspruch 8, wobei, vorausgesetzt, dass W den Abstand zwischen den Seitenwandoberflächen (2) in dem Führungsabschnitt (18) jeder Vertiefung (16) repräsentiert; D_{10} einen Außendurchmesser der Haltewelle (7) repräsentiert; und B einen Wert W (Abstand) / D_{10} (Außendurchmesser) repräsentiert, der Wert B in dem Bereich von $0{,}15 \leq B \leq 0{,}8$ liegt.

10. Nagelschneider nach einem der Ansprüche 3 bis 9, wobei ein Abstand W zwischen den Seitenwandoberflächen (20) jeder Vertiefung (16) derart ausgestaltet ist, dass er auf der Seite des Öffnungsabschnitts (17) größer als auf der Seite des Verbindungsabschnitts (19) oder auf der Seite des Führungsabschnitts (18) ist.

11. Nagelschneider nach Anspruch 3, wobei jeder Vorsprung (15) einen proximalen Abschnitt (26), einen distalen Abschnitt (27), eine Umfangsoberfläche (28) und eine Endfläche (29) an dem distalen Abschnitt (27) aufweist; wobei der Vorsprung (15) einen Querschnittsbereich aufweist, welcher ortho-

gonal zu der axialen Richtung (15a) davon ist, der derart ausgestaltet ist, dass er auf der proximalen Seite größer als auf der distalen Seite ist.

12. Nagelschneider nach Anspruch 11, wobei der Querschnitt jedes Vorsprungs (15) orthogonal zu der axialen Richtung davon eine kreisförmige Form aufweist und sich ein Außendurchmesser des Vorsprungs allmählich von dem proximalen Abschnitt (26) zu dem distalen Abschnitt (27) verringert.

13. Nagelschneider nach Anspruch 12, wobei, vorausgesetzt, dass D_{26} den Außendurchmesser des proximalen Abschnitts (26) jedes Vorsprungs (15) repräsentiert, M eine axiale Länge des Vorsprungs (15) von dem proximalen Abschnitt (26) zu dem distalen Abschnitt (27) repräsentiert; und E einen Wert D_{26} (Außendurchmesser) / M (Länge) repräsentiert, der Wert E in dem Bereich von $1 \leq E \leq 3$ liegt.

14. Nagelschneider nach Anspruch 12 oder 13, wobei, vorausgesetzt, dass N die Summe von axialen Längen M in dem Paar Vorsprünge (15) repräsentiert; P einen Abstand zwischen den Endflächen (29) der Vorsprünge (15) repräsentiert; und F einen Wert N (Summe der Längen) / P (Abstand) repräsentiert, der Wert F in dem Bereich von $1 \leq F \leq 3$ liegt.

15. Nagelschneider nach Anspruch 3, wobei die beiden Seitenwandoberflächen (20) in jeder Vertiefung (16) der Haltewelle (7) derart nebeneinander vorhanden sind, dass sie sich im Wesentlichen in Kontakt mit der Umfangsoberfläche des Vorsprungs (15) des Hebels (12) befinden.

16. Nagelschneider nach Anspruch 15, wobei der Abstand W zwischen den Seitenwandoberflächen (20) in jeder Vertiefung (16) der Haltewelle (7) derart ausgestaltet ist, dass er auf einer offenen Seite größer als auf der Seite der Bodenoberfläche (21) ist, so dass er zu der tieferen Seite der Vertiefung (16) hin kleiner wird.

17. Nagelschneider nach einem der Ansprüche 3 bis 16, wobei die Haltewelle (7) einen Kopf (8), welcher an dem unteren Ende davon angeordnet ist, und einen Schaft (10), welcher durch eine Stufe (9) angrenzend an dem Kopf ausgebildet ist, aufweist; wobei der Kopf (8) einen Außendurchmesser D_8 aufweist, welcher größer als ein Außendurchmesser D_{10} des Schaftes (10) ist; und wobei, vorausgesetzt, dass H die axiale Länge des Kopfes (8) repräsentiert, L die axiale Länge des Schaftes (10) repräsentiert und C einen Wert H (Breite) / L (Länge) repräsentiert, der Wert C in dem Bereich von $0{,}05 \leq C \leq 0{,}3$ liegt.

18. Nagelschneider nach Anspruch 17, wobei die Stufe (9), welche zwischen dem Kopf (8) und dem Schaft (10) in der Haltewelle (7) ausgebildet ist, mit einem Verstärkungsabschnitt (24) versehen ist, welcher einen gebogenen Querschnitt aufweist, der vollständig entlang des Umfangs davon ausgebildet ist, und wobei, vorausgesetzt, dass r den Radius in einem Querschnittprofil des Verstärkungsabschnitts (24) repräsentiert, der Wert r in dem Bereich von $0{,}1\text{mm} \leq r \leq 3\text{mm}$ liegt.

19. Nagelschneider nach einem der Ansprüche 3 bis 18, wobei, wenn der Vorsprung (15) in dem Führungsabschnitt (18) der Vertiefung (16) gehalten wird, der Vorsprung (15) in einen Presskontakt mit den Seitenwandoberflächen (20) des Führungsabschnitts (18) unter einer Federwirkung des oberen (1) und unteren (2) Klingenkörpers gebracht wird, so dass er sich nicht zu dem Verbindungsabschnitt (19) der Vertiefung (16) verschiebt.

20. Nagelschneider nach Anspruch 3, wobei jede Vertiefung (16) ein Paar Öffnungsabschnitte (17) aufweist, welche auf jeder Seite der axialen Linie der Haltewelle (7) definiert sind.

21. Nagelschneider nach einem der Ansprüche 3 bis 20, wobei die Vorsprünge (15) auf den Haltearmen (13) des Hebels (12) aus einem Metall hergestellt sind, und wobei für den Fall, dass der Hebel aus einem synthetischen Harzmaterial modelliert ist, die Vorsprünge (15) ganzheitlich mit dem Hebel ausgebildet sind, wobei ein Einsatz verwendet wird.

22. Nagelschneider nach einem der Ansprüche 3 bis 21, wobei die Haltewelle (7) an dem unteren Ende ein Verriegelungsstiftloch (25) aufweist.

Revendications

1. Coupe-ongles, comprenant un corps formant lame supérieure (1) présentant un bord coupant supérieur (3) ; un corps formant lame inférieure (2) présentant un bord coupant inférieur (4), faisant face au bord coupant supérieur (3); un axe de support (7) inséré dans les corps formant lames (1, 2) à proximité des bords coupants (3, 4) respectifs, une partie d'extrémité inférieure de l'axe de support (7) étant en prise avec le corps formant lame inférieure (2) afin d'être bloquée par celui-ci, tandis qu'une extrémité supérieure de l'axe de support (7) fait saillie vers le haut à travers le corps formant lame supérieure (1) ; et un levier (12), comportant une première partie de support (13) qui est reliée sur le corps formant lame supérieure (1) à une seconde partie de support, située au niveau d'une extrémité supérieure (11) de l'axe de support (7) ; les bords cou-

pants (3, 4) des corps formant lames (1, 2) étant amenés en contact forcé l'un contre l'autre, en exerçant une pression par le levier (12) sur le corps formant lame supérieure (1), de manière antagoniste à l'élasticité des corps formant lame supérieure (1) et lame inférieure (2),

caractérisé par

une protubérance (15), constituant la première partie de support (13) du levier (12) ou la seconde partie de support de l'axe de support (7), et

une entaille (16), constituant l'autre partie de support et dans laquelle pénètre la protubérance (15) ;

l'entaille (16) présentant une partie d'ouverture (17) par laquelle la protubérance (15) peut entrer et sortir, une partie de guidage (18) capable de soutenir de manière pivotante la protubérance (15), et une partie de jonction (19) reliant la partie d'ouverture (17) et la partie de guidage (18) l'une à l'autre ; l'entaille (16) comportant une paire de surfaces formant parois latérales (20) situées en face l'une de l'autre dans la partie d'ouverture (17), la partie de jonction (19) et la partie de guidage (18), ainsi qu'une surface de fond (21) reliant les surfaces formant parois latérales (20) l'une à l'autre.

2. Coupe-ongles selon la revendication 1, dans lequel le coupe-ongles comprend

une paire de protubérances (15), incluant ladite protubérance constituant la première partie de support (13) du levier (12), ou la seconde partie de support de l'axe de support (7), et une paire d'entailles (16), incluant ladite entaille (16) constituant l'autre partie de support, et avec lesquelles les protubérances (15) sont respectivement en prise ;

les entailles (16) ayant chacune une partie d'ouverture (17) par laquelle la protubérance (15) respective peut entrer et sortir, une partie de guidage (18) capable de soutenir de manière pivotante la protubérance (15), et une partie de jonction (19) reliant la partie d'ouverture (17) et la partie de guidage (18) l'une à l'autre ; les entailles (16) comportant chacune une paire de surfaces formant parois latérales (20) situées en face l'une de l'autre dans la partie d'ouverture (17), la partie de jonction (19) et la partie de guidage (18), ainsi qu'une surface de fond (21) reliant les surfaces formant parois latérales (20) l'une à l'autre.

3. Coupe-ongles selon la revendication 2, dans lequel les protubérances (15), constituant une partie de support, sont prévues respectivement dans des bras de support (13) dudit levier (12), afin d'être opposées l'une à l'autre dans un évidement d'appui (14) du levier (12), tandis que les entailles (16), constituant l'autre partie de support, sont définies sur la circonférence de l'axe de support (7) afin d'être opposées respectivement aux protubérances (15).

4. Coupe-ongles selon la revendication 3, dans lequel les entailles (16), définies dans l'axe de support (7), sont séparées l'une de l'autre par une plaque de fond (23) dans la totalité de la partie d'ouverture (17), de la partie de jonction (19) et de la partie de guidage (18), et dans lequel chaque entaille comporte une surface de fond (21), formée sur la plaque de fond (23) dans la totalité de la partie d'ouverture (17), de la partie de jonction (19) et de la partie de guidage (18).

5. Coupe-ongles selon la revendication 4, dans lequel la distance entre les surfaces de fond (21) des entailles (16) ou l'épaisseur de la plaque de fond (23) est prévue pour être plus grande du côté de la partie d'ouverture (17) que du côté de la partie de guidage (18).

6. Coupe-ongles selon la revendication 4 ou 5, dans lequel, si T représente la distance entre les surfaces de fond (21) des entailles (16) ou l'épaisseur de la plaque de fond (23) ; si D_{10} représente un diamètre extérieur de l'axe de support (7) ; et si A représente une valeur T (épaisseur) / D_{10} (diamètre extérieur), la valeur A est comprise dans la plage de $0 \leq A \leq 0,5$.

7. Coupe-ongles selon l'une quelconque des revendications 3 à 6, dans lequel une ligne médiane, située entre les surfaces formant parois latérales (2) de chaque entaille (16) de l'axe de support (7), traverse la partie d'ouverture (17), la partie de jonction (19) et la partie de guidage (18), et contient une première partie (17a) passant à travers la partie d'ouverture (17), une deuxième partie (19a) passant à travers la partie de jonction (19), et une troisième partie (18a) passant à travers la partie de guidage (18).

8. Coupe-ongles selon la revendication 7, dans lequel la deuxième partie (19a) de la ligne médiane contient une partie, qui s'étend depuis la partie d'ouverture (17) jusqu'à la partie de jonction (19), de façon orthogonale au sens axial de l'axe de support (7), et une partie, qui s'étend depuis la partie de jonction (19) jusqu'à la partie de guidage (18), dans le sens axial de l'axe de support (7).

9. Coupe-ongles selon la revendication 8, dans lequel, si W représente la distance entre les surfaces formant parois latérales (20) de la partie de guidage (18) de chaque entaille (16) ; si D_{10} représente un diamètre extérieur de l'axe de support (7) ; et si B représente une valeur une valeur W (distance) / D_{10} (diamètre extérieur), la valeur B est comprise dans la plage de $0,15 \leq B \leq 0,8$.

10. Coupe-ongles selon l'une quelconque des revendi-

cations 3 à 9, dans lequel une distance W entre les surfaces formant parois latérales (20) de chaque entaille (16) est prévue pour être plus grande du côté de la partie d'ouverture (17) que du côté de la partie de jonction (19), ou du côté de la partie de guidage (18).

11. Coupe-ongles selon la revendication 3, dans lequel chaque protubérance (15) a une partie proximale (26), une partie distale (27), une surface périphérique (28) et une face d'extrémité (29) au niveau de la partie distale (27) ; et dans lequel la protubérance (15) présente une aire de la section transversale, orthogonale au sens axial (15a) de celle-ci, qui est prévue pour être plus grande du côté proximal que du côté distal.

12. Coupe-ongles selon la revendication 11, dans lequel la section transversale de chaque protubérance (15), orthogonale à la direction axiale de celle-ci, a une forme circulaire, et un diamètre extérieur de la protubérance diminue graduellement à partir de la partie proximale (26) en direction de la partie distale (27).

13. Coupe-ongles selon la revendication 12, dans lequel, si D_{26} représente le diamètre extérieur de la partie proximale (26) de chaque protubérance (15) ; si M représente une longueur axiale de la protubérance (15) à partir de la partie proximale (26) jusqu'à la partie distale (27) ; et si E représente une valeur D_{26} (diamètre extérieur) / M (longueur), la valeur de E est comprise dans la plage de $1 \leq E \leq 3$.

14. Coupe-ongles selon la revendication 12 ou 13, dans lequel, si N représente la somme des longueurs axiales M dans la paire de protubérances (15) ; si P représente une distance entre les faces d'extrémité (29) des protubérances (15) ; et si F représente une valeur N (somme des longueurs) / P (distance), la valeur F est comprise dans la plage de $1 \leq F \leq 3$.

15. Coupe-ongles selon la revendication 3, dans lequel les deux surfaces formant parois latérales (20) de chaque entaille (16) de l'axe de support (7) sont prévues de manière adjacente l'une à l'autre, de telle sorte qu'elles soient sensiblement en contact avec la surface périphérique de la protubérance (15) du levier (12).

16. Coupe-ongles selon la revendication 15, dans lequel la distance W entre les surfaces formant parois latérales (20) de chaque entaille (16) de l'axe de support (7) est prévue pour être plus grande du côté de l'ouverture que du côté de la surface de fond (21), de telle manière qu'elle devienne plus petite en direction du côté plus profond de l'entaille (16).

17. Coupe-ongles selon l'une quelconque des revendications 3 à 16, dans lequel l'axe de support (7) comporte une tête (8), située au niveau de son extrémité inférieure, et une tige (10) formée de façon contiguë à la tête par l'intermédiaire d'un épaulement (9) ; la tête (8) a un diamètre extérieur D_8, qui est plus grand qu'un diamètre extérieur D_{10} de la tige (10) ; et dans lequel, si H représente la longueur axiale de la tête (8), si L représente la longueur axiale de la tige (10) et si C représente une valeur H (largeur) / L (longueur), la valeur C est comprise dans la plage de $0{,}05 \leq C \leq 0{,}3$.

18. Coupe-ongles selon la revendication 17, dans lequel l'épaulement (9), formé entre la tête (8) et la tige (10) de l'axe de support (7), comporte une partie de renforcement (24), présentant une section transversale arquée, formée entièrement le long de la périphérie de celui-ci, et dans lequel, si r représente le rayon dans un profil de la section transversale de la partie de renforcement (24), la valeur r est comprise dans la plage de $0{,}1 \text{ mm} \leq r \leq 3 \text{ mm}$.

19. Coupe-ongles selon l'une quelconque des revendications 3 à 18, dans lequel, lorsque la protubérance (15) est soutenue dans la partie de guidage (18) de l'entaille (16), la protubérance (15) est mise en contact forcé avec les surfaces formant parois latérales (20) de la partie de guidage (18), sous l'effet de l'élasticité des corps formant lame supérieure (1) et lame inférieure (2), de telle sorte qu'elle ne se déplace pas vers la partie de jonction (19) de l'entaille (16).

20. Coupe-ongles selon la revendication 3, dans lequel chaque entaille (16) comporte une paire de parties d'ouverture (17), définies de chaque côté de la ligne axiale de l'axe de support (7).

21. Coupe-ongles selon l'une quelconque des revendications 3 à 20, dans lequel les protubérances (15) situées sur les bras de support (13) du levier (12) sont faites en métal et, si le levier est moulé à partir d'une résine synthétique, les protubérances (15) sont alors formées d'un seul tenant avec le levier (12) en utilisant un insert.

22. Coupe-ongles selon l'une quelconque des revendications 3 à 21, dans lequel l'axe de support (7) présente, au niveau de son extrémité inférieure, un trou (25) pour doigt de verrouillage.

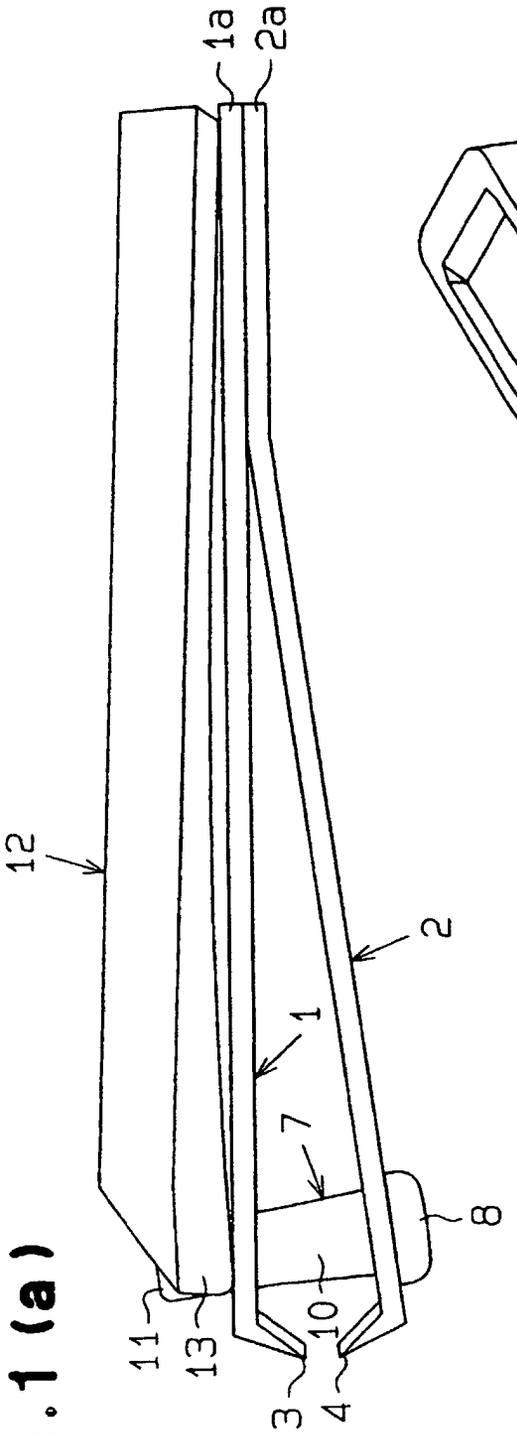


Fig.1 (a)

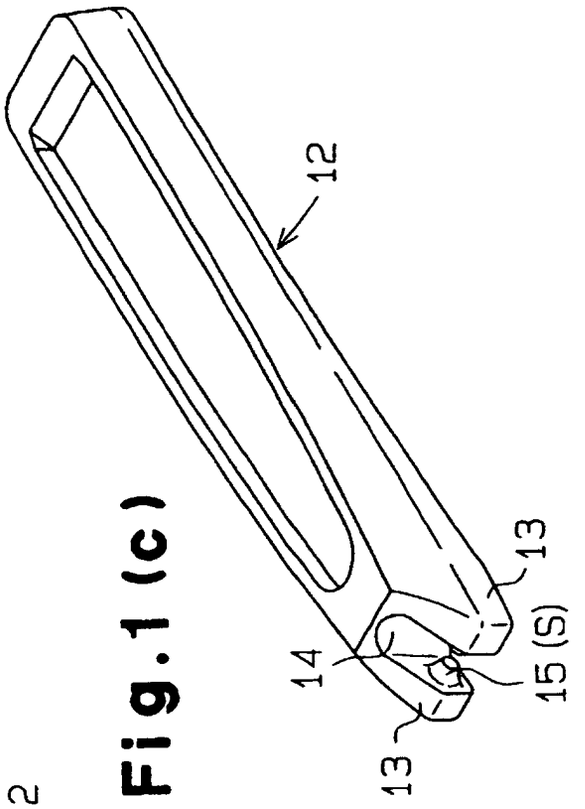


Fig.1 (c)

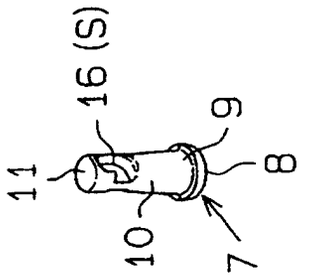


Fig.1 (b)

Fig.2(a)

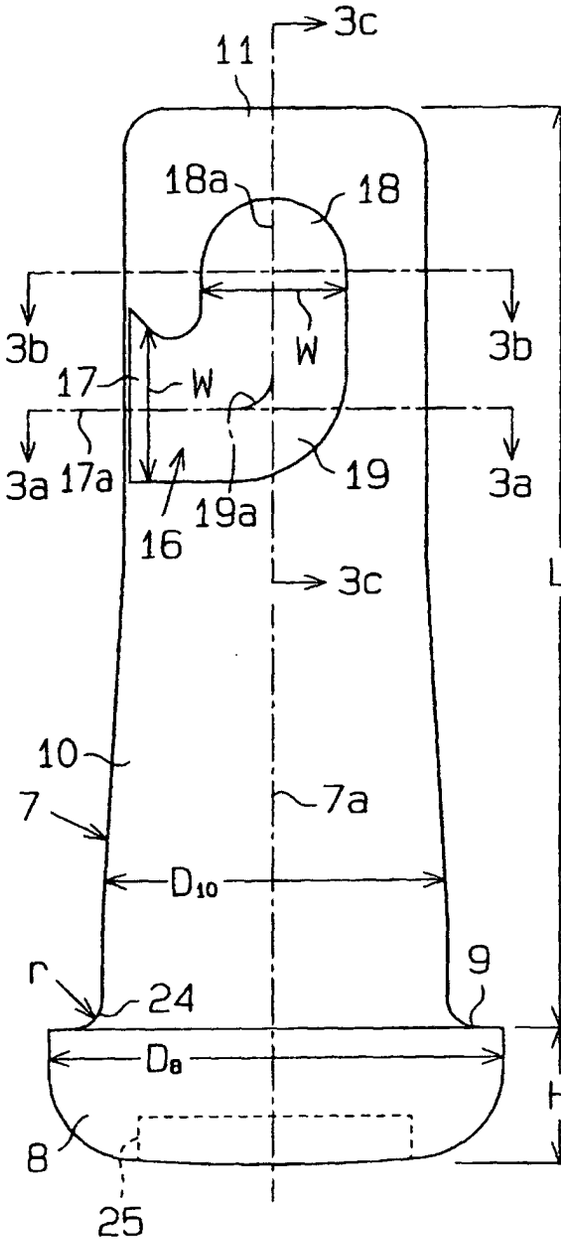


Fig.2(b)

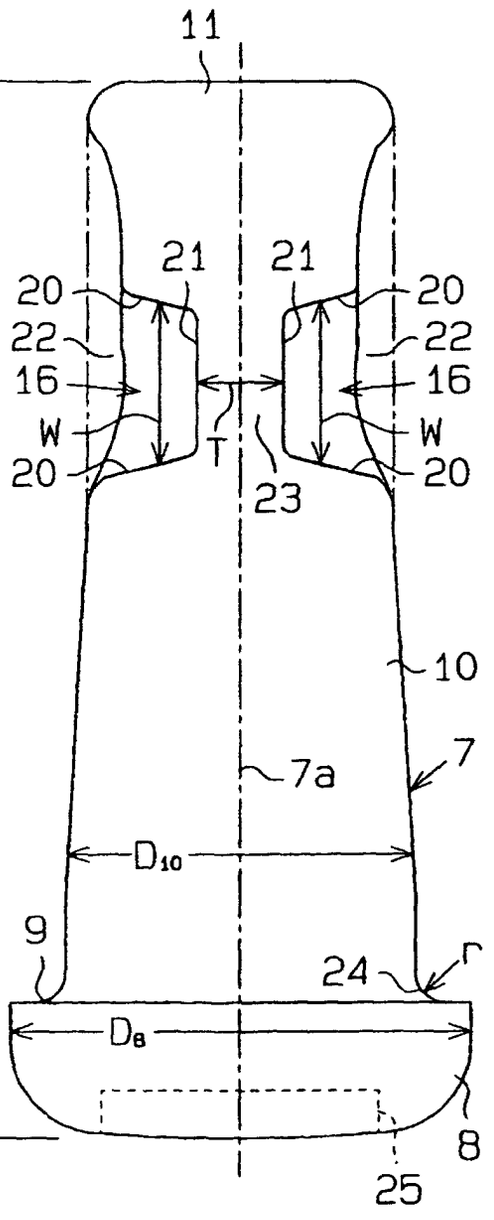


Fig.2(c)

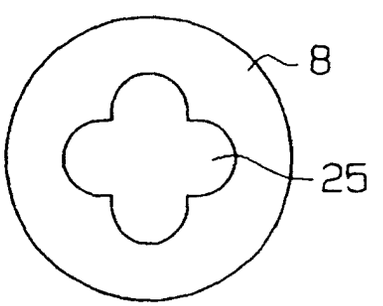


Fig.3(a)

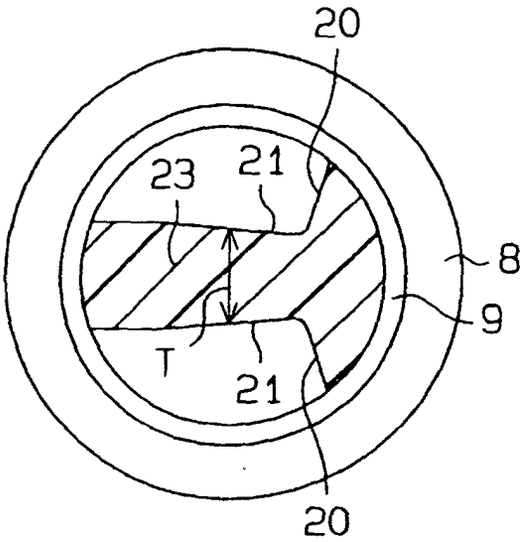


Fig.3(b)

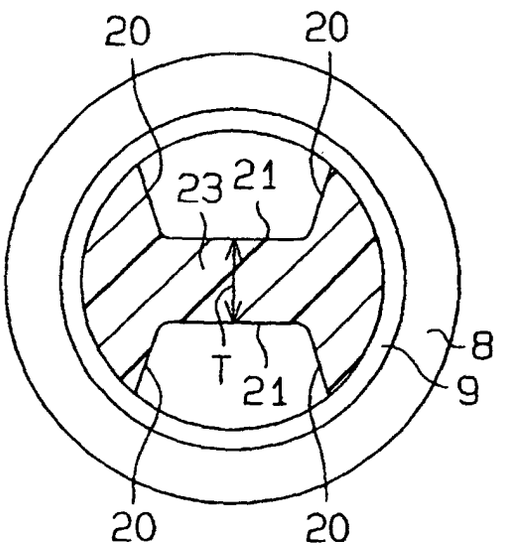


Fig.3(c)

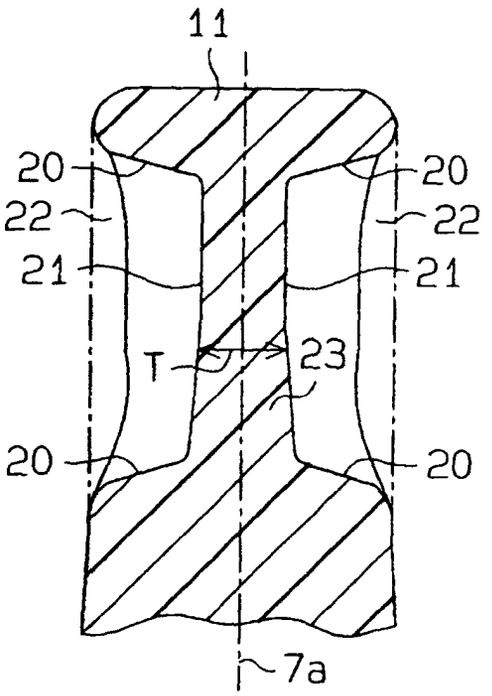


Fig.4(a)

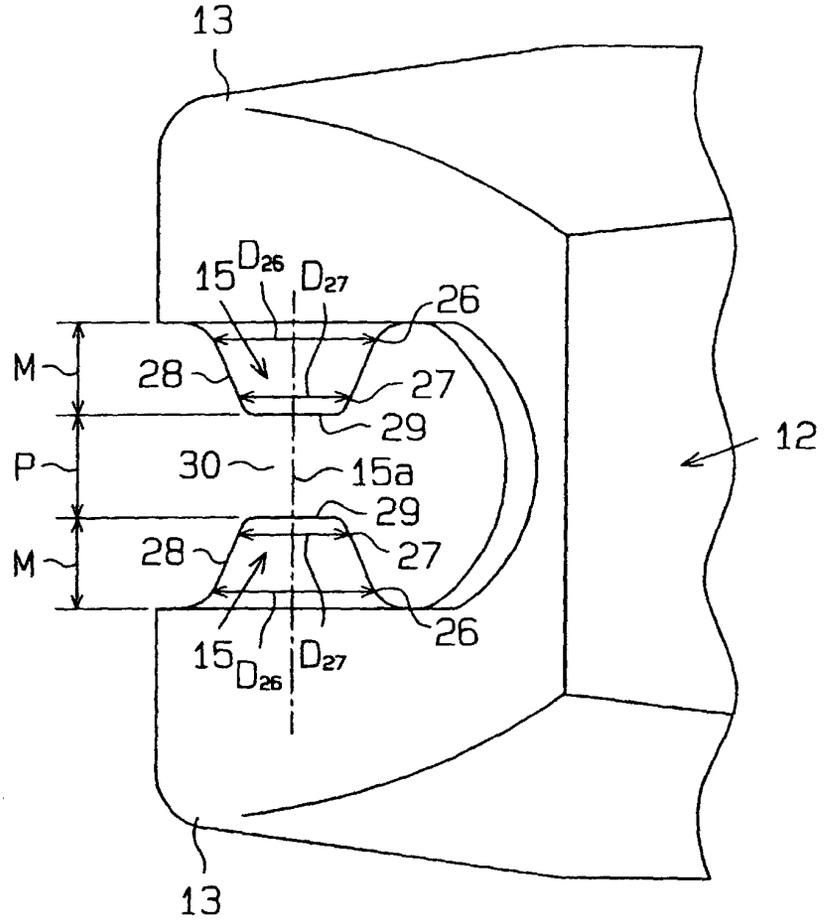

13
15
D_{26}
D_{27}
26
M
28
27
29
P
30
15a
12
M
28
27
29
26
15
D_{26}
D_{27}
13

Fig.4(b)

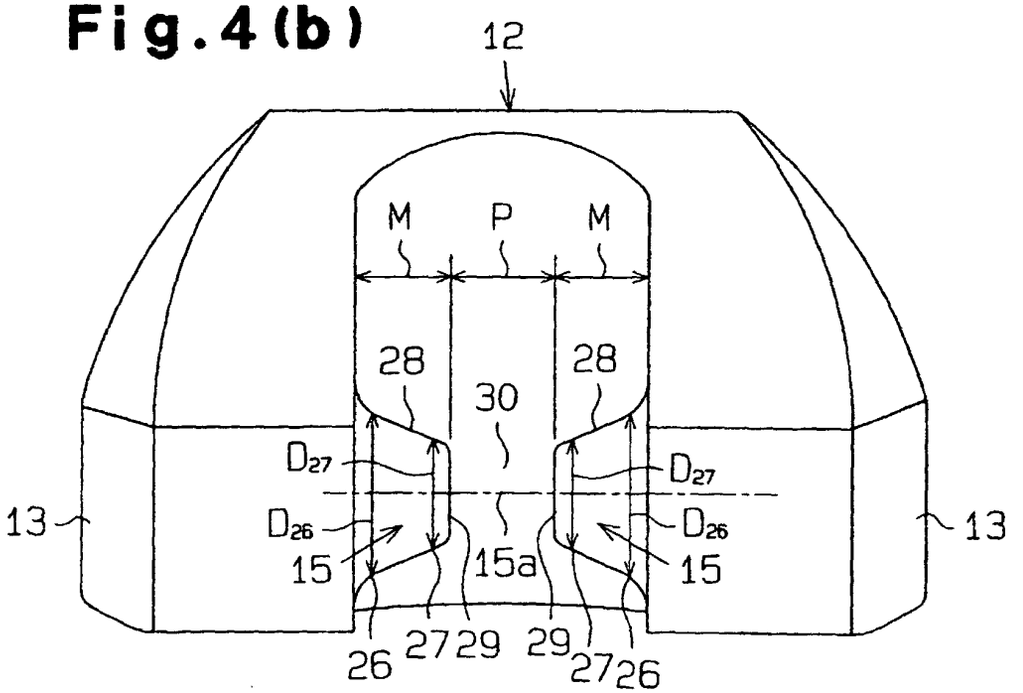

12
M
P
M
28
28
30
D_{27}
D_{27}
13
D_{26}
D_{26}
13
15
15a
15
26
27
29
29
27
26

Fig.5(a)

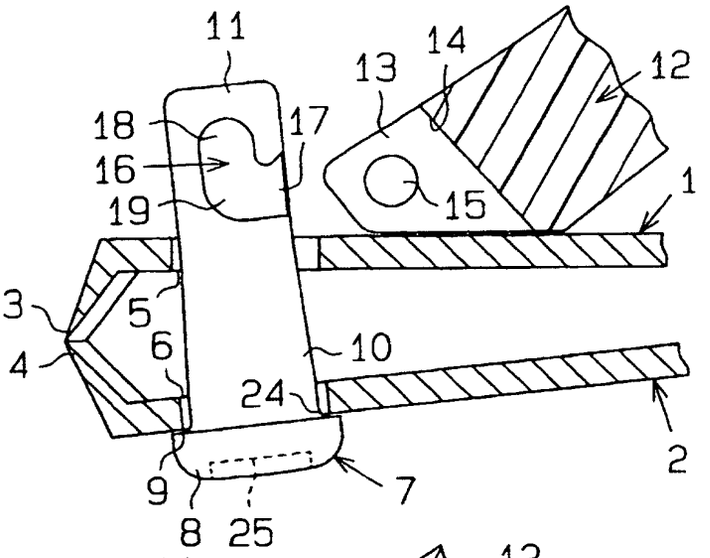


Fig.5(b)

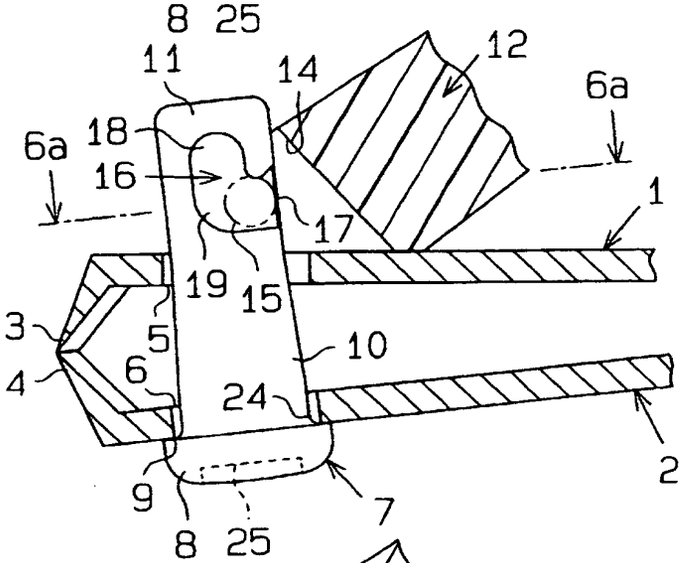


Fig.5(c)

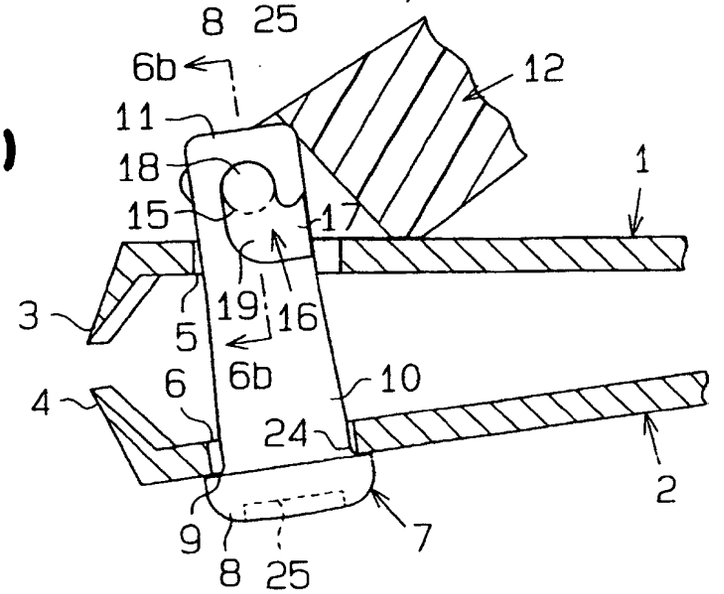


Fig.6(a)

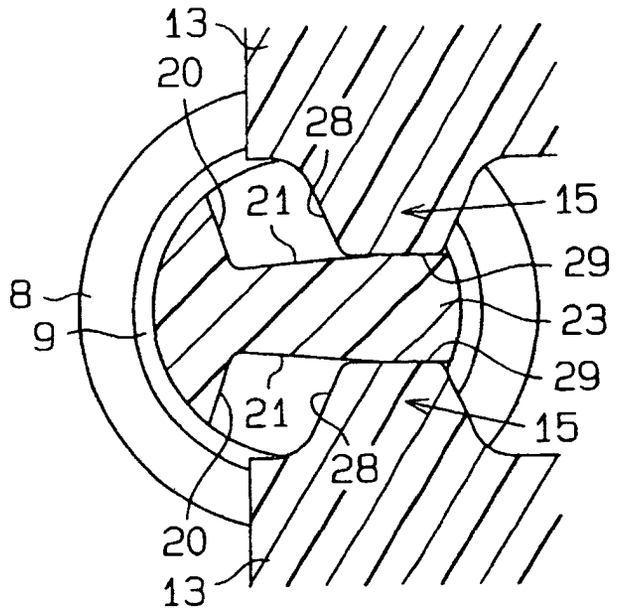

13
20
28
21
15
29
8
9
23
29
21
15
28
20
13

Fig.6(b)

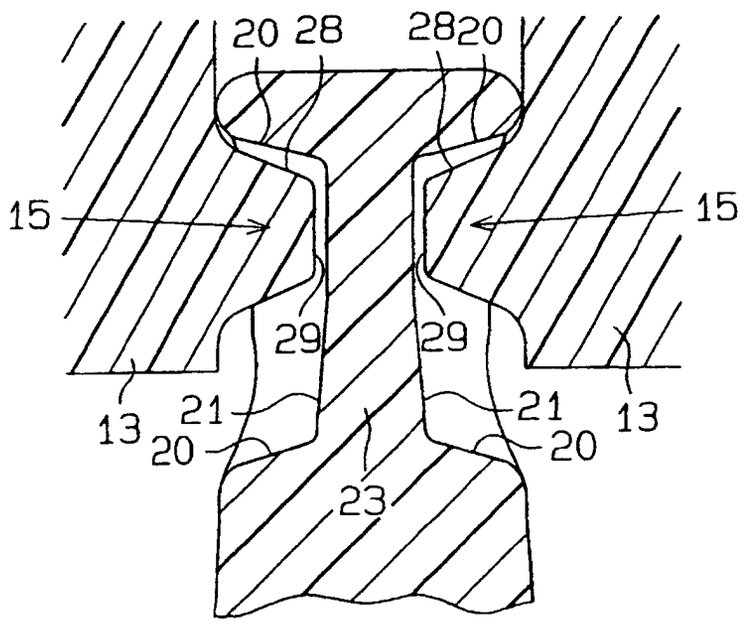

20 28
2820
15
15
29
29
13
21
21
13
20
20
23

Fig.7(a)

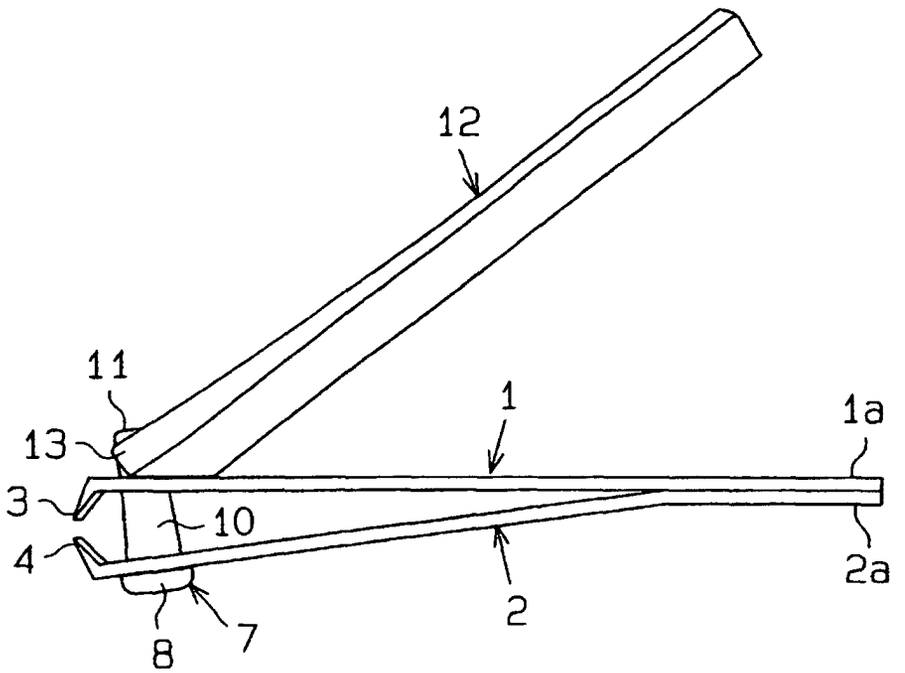


Fig.7(b)

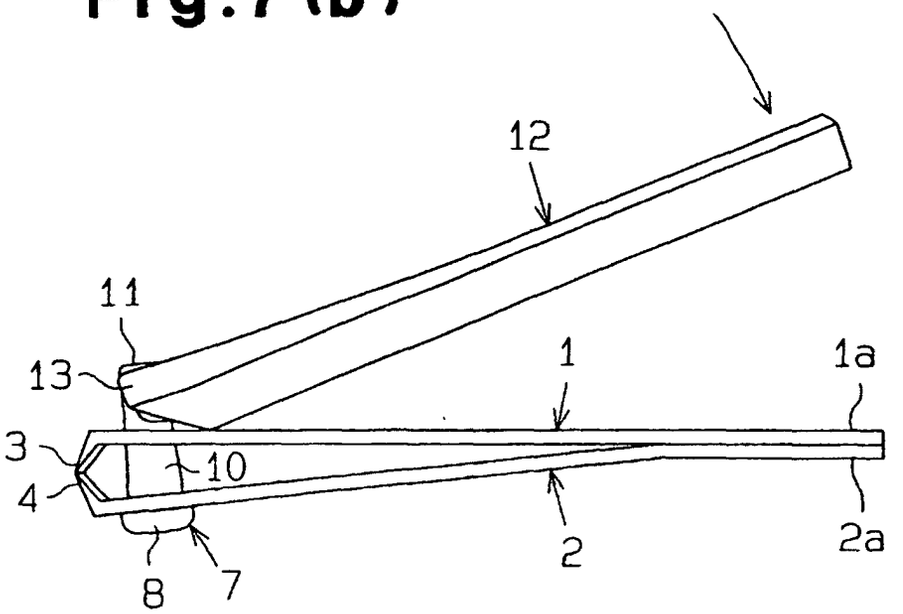


Fig.8(a)

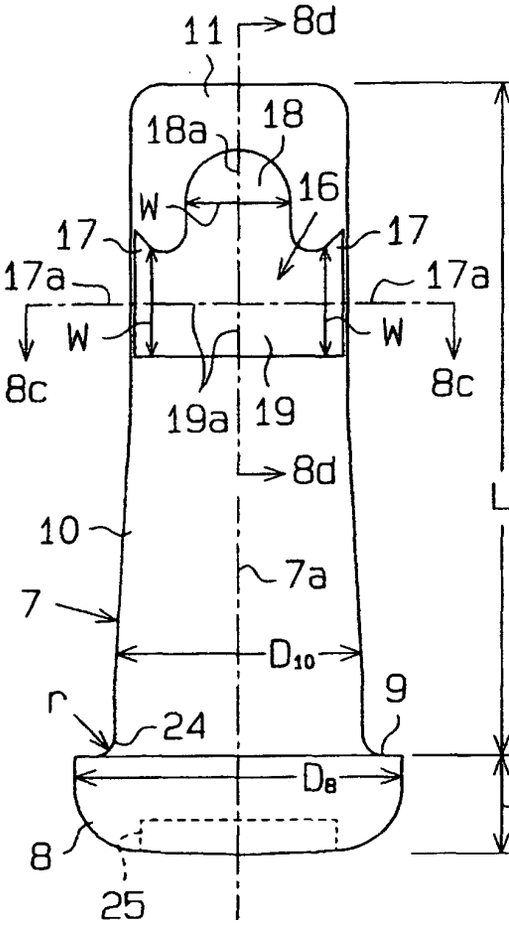


Fig.8(b)

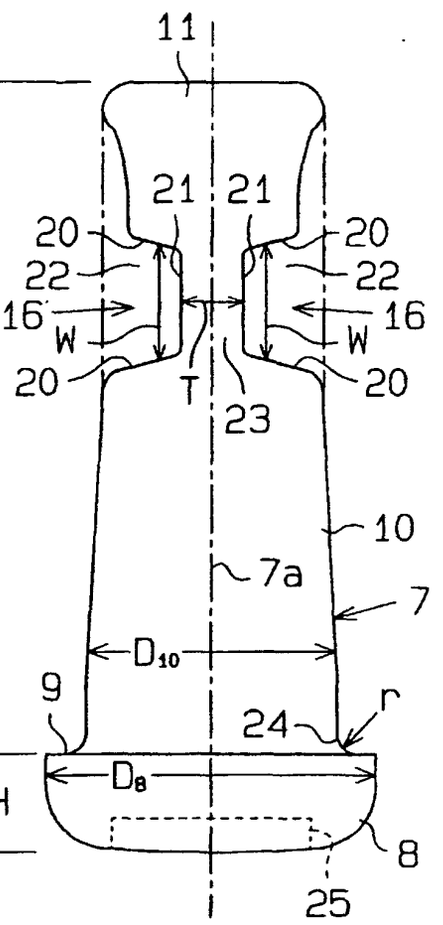


Fig.8(c)

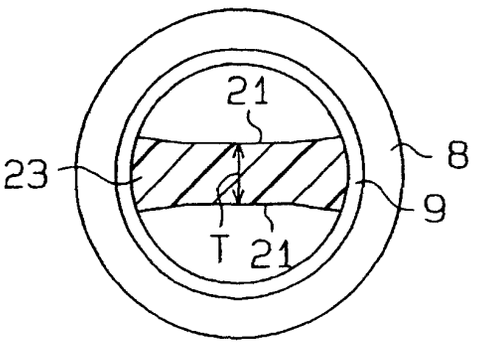


Fig.8(d)

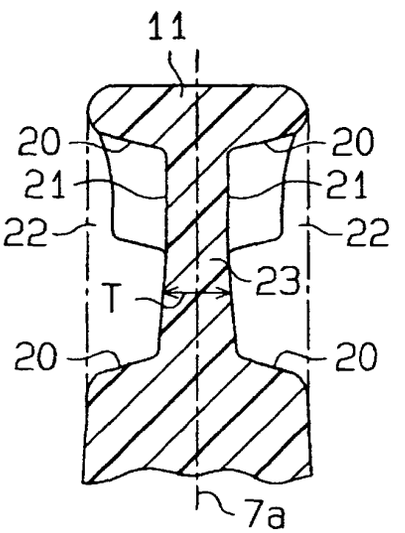


Fig.9(a)

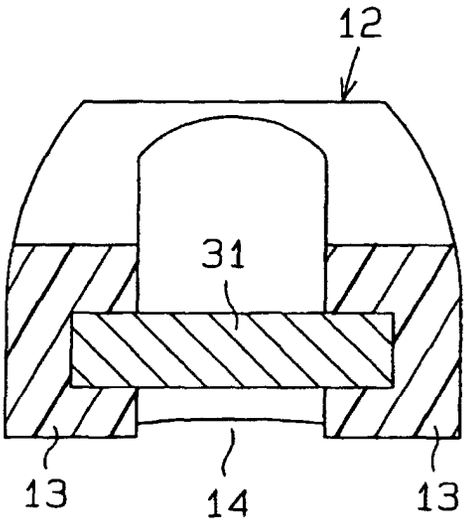


Fig.9(b)

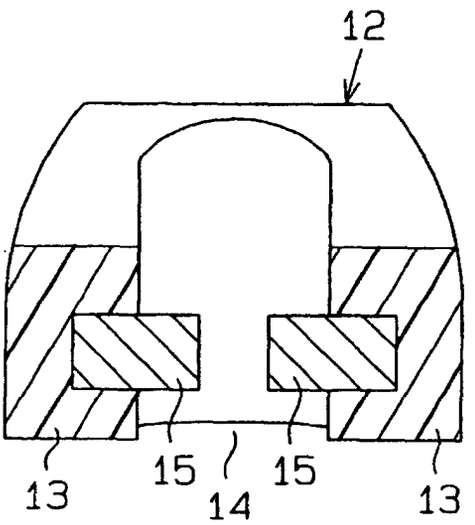


Fig.10(a)

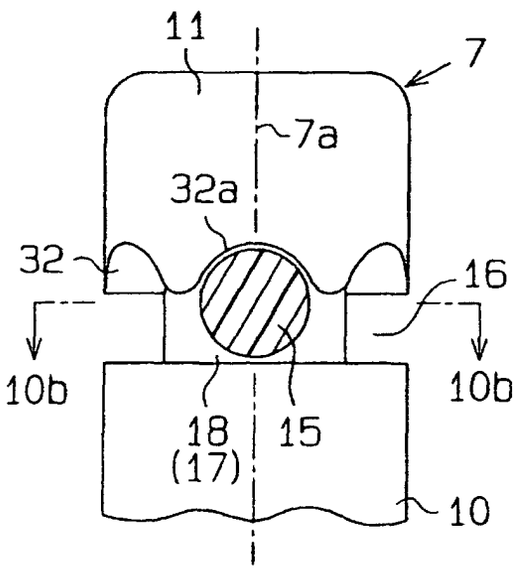


Fig.10(b)

